

CBNSF
20.2.6 VI

**STATEMENT OF WORK
FOR THE UNILATERAL ADMINISTRATIVE ORDER
REMEDIAL DESIGN, REMEDIAL ACTION & LONG-TERM MONITORING**

Docket No. CERCLA 10-2002-0064

**MOUTH OF HYLEBOS WATERWAY PROBLEM AREA:
SEGMENTS 3, 4 AND 5
And Portions of Segment 1**

**COMMENCEMENT BAY NEARSHORE/TIDEFLATS SUPERFUND SITE
TACOMA, WASHINGTON**



03/25/02

Mouth of Hylebos Waterway SOW
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I. PURPOSE

The purpose of this Statement of Work (SOW) is to set forth requirements for implementation of the remedial action that Respondents are required to perform under the Unilateral Administrative Order (UAO) for Remedial Design and Remedial Action, Docket No. CERCLA 10-2002-0064. This SOW addresses Segments 3, 4, and 5, and portions of Segment 1 of the Hylebos Waterway (hereinafter collectively referred to as the "Mouth of Hylebos Waterway Problem Area", further described below). This SOW is consistent with the Record of Decision (ROD), signed by the Regional Administrator of the United States Environmental Protection Agency (EPA), Region 10 on September 30, 1989 (1989 ROD), for the Commencement Bay Nearshore/Tideflats (CB/NT) Superfund Site (CB/NT Site), and the Explanation of Significant Difference (ESD) dated July 28, 1997 (1997 ESD) and a separate ESD dated August 3, 2000 (2000 ESD). The 2000 ESD specifies the cleanup plan, various performance criteria and the disposal sites for the Hylebos Waterway Problem Areas, among other CB/NT problem areas. The 1997 ESD modified the sediment cleanup standard for polychlorinated biphenyls (PCBs). This SOW is Attachment 4 to the above-referenced UAO.

The Mouth of Hylebos Waterway Problem Area, located within the Commencement Bay Nearshore/Tideflats (CB/NT) Superfund Site in Pierce County, Washington is shown on Figures 1 and 2. Using the delineation of Hylebos Waterway segments developed during the Hylebos Cleanup Committee's pre-remedial design activities, Segment 5 includes all sediment within the Hylebos Waterway north of East Eleventh Street Bridge. Segments 3 and 4 are located south of East Eleventh Street Bridge and north of or adjacent to the former Murray Pacific facility, including SMA 302, as depicted in the 2000 ESD. In conducting work specified in this SOW the Respondents shall follow: the 1989 ROD as modified by the 1997 and 2000 ESDs; approved pre-remedial design deliverables; this SOW; approved Remedial Design and Remedial Action Work Plans; and EPA Superfund Remedial Design and Remedial Action Guidance applicable to submitting deliverables for designing and implementing the remedial action at the Mouth of Hylebos Waterway Problem Area of the CB/NT Site. Segment 1 of the Hylebos Waterway is depicted in Figure 3 and includes the Upper Turning Basin at the southernmost end of the waterway and portions of the neck of the waterway. This SOW includes those portions of Segment 1 located in the Upper Turning Basin designated as Sediment Management Area (SMA) 103 and 123.

Disposal sites for contaminated sediments were identified in the 2000 ESD which provide the Respondents with suitable locations for sediment waste disposal. This SOW, however, assumes that Blair Slip 1 will be utilized in the implementation of this SOW, because the Port of Tacoma and Occidental Chemical Corporation have prepared a 90% design dated June 29, 2001 for the Blair Slip 1 disposal site and Segment 5 of the Hylebos Waterway. This document was

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previously submitted to EPA for consideration. Based on this stage of remedial design, remediation work can begin in 2002 with Blair Slip 1 to be utilized as the disposal site for this SOW. EPA assumes that pier demolition in the Blair Slip 1 and PSDDA dredging in Segment 5 can be initiated early in the dredging season through EPA's conditional approval of relevant portions of the Segment 5 design documents previously submitted to EPA by the Port of Tacoma and Occidental Chemical Corporation.

One objective in implementing the requirements of this SOW is to maximize remedial action that can reasonably occur in the 2002 dredging season. Section V of this SOW requires pier demolition and PSDDA dredging to occur in 2002. However, in preparation of the Remedial Design Work Plan, the Respondents to this Order shall propose an implementation strategy that identifies additional remedial action elements to be accomplished or provides an explanation of limitations for the amount of remedial action that can be accomplished in 2002.

Alternatively, if Respondents do not want to use Blair Slip 1 as a disposal Site for contaminated sediments addressed under this SOW, Respondents must prepare a remedial design identifying another acceptable disposal option as specified in the 2000 ESD and ensure that remedial dredging and disposal will begin in 2003.

Implementation of this SOW shall result in achieving the CB/NT Site cleanup objectives including the Sediment Quality Objectives (SQOs).

II. DESCRIPTION OF REMEDIAL ACTION

A. Key Elements of CB/NT ROD

The CB/NT ROD selected a remedy comprised of five (5) key elements: site use restrictions (now commonly referred to as institutional controls), source control, natural recovery, sediment remedial action (i.e., confinement), and monitoring, to address contaminated sediments in the waterways of the CB/NT Site.

Four (4) of the five (5) primary elements of the CB/NT ROD will be implemented under this SOW: sediment remedial action (including habitat mitigation), natural recovery (including the potential for active sediment remediation if natural recovery does not occur as required), site use restrictions, and monitoring. Source control of ongoing sources of hazardous substances to the Hylebos Waterway problem areas is not an element of this SOW. The Washington State Department of Ecology (Ecology) has been designated as the lead agency for source control at the CB/NT Site. Ecology issued its Milestone 5 report, the final administrative milestone for source control, documenting completion of activities for Hylebos Waterway on June 14, 2000.

Remaining source control actions are either being addressed by Ecology as source control actions, or as separate cleanup actions. Monitoring for source control effectiveness will be implemented under this SOW to assist EPA in verifying source control effectiveness. Specific monitoring requirements will be set forth in the Operations, Maintenance, and Monitoring Plan described in Task 5 of Section IV of the SOW.

B. Cleanup Objectives

The cleanup objectives for the remedial action, as described in Section 10 of the 1989 ROD, state, "the selected remedy is to achieve acceptable sediment quality in a reasonable time frame" (CB/NT ROD, p. 97). Habitat function and enhancement of fisheries resources are also project cleanup objectives.

1. Acceptable Sediment Quality in a Reasonable Time Frame

"Acceptable sediment quality" is defined as "the absence of acute or chronic adverse effects on biological resources or significant human health risk" (CB/NT ROD, p.62). The ROD designated biological test requirements and associated sediment chemical concentrations referred to as sediment quality objectives (SQOs) to attain cleanup objectives for the CB/NT Site. The PCB SQO was subsequently updated in a 1997 ESD.

SQOs are performance standards for the CB/NT Site. Sediment quality objectives for individual chemicals specified in the ROD, as amended in the 1997 ESD, are provided in Table 1 to this SOW. In addition to the SQOs, Respondents may elect, with EPA approval, to perform biological toxicity tests for all chemicals except PCBs to demonstrate the absence of biological effects predicted by the SQOs. Toxicity testing may also be used to assess the suitability of sediments for open-water disposal when chemical data predict that biological effects might be present. Relevant biological test criteria are provided in Table 2 to this SOW.

A "reasonable time frame" incorporates the ROD's selection of natural recovery for sediments in the CB/NT Site that are minimally contaminated and are predicted to naturally recover within 10 years from implementation of the remedial action in any given problem area. The Pre-Remedial Design Evaluation Report identified a number of different potential natural recovery areas, including areas within the Mouth of Hylebos Waterway Problem Area. However, since these identified natural recovery areas overlap with subsurface chemistry, the Respondents may address some or all of these areas through active remediation rather than rely on natural recovery and long-term monitoring. Performance monitoring of natural recovery areas is a requirement of this SOW and is discussed in more detail in Section III.C below.

Except for natural recovery areas, the time frame for achieving SQOs shall be the end of construction of individual elements of the remedial action, as detailed in the Construction Quality Assurance Plan (CQAP) and Operation Maintenance and Monitoring Plan (OMMP), as appropriate, to be approved by EPA under this SOW. Determining whether SQOs have been achieved will be verified through a comparison with SQOs, and with a statistical comparison of performance monitoring data with SQOs, surrounding surface chemistry, and Sediment Remedial Action Levels (SRALs). The sediment quality monitoring and decision framework will be detailed in the OMMP.

2. Habitat Function and Enhancement of Fisheries Resources

Habitat function and enhancement of fisheries resources have also been incorporated as part of the overall project cleanup objectives. For example, the physical characteristics and placement of material used for capping contaminated sediments in the marine environment will be required to provide a suitable substrate and habitat for aquatic organisms that may utilize that environment. The exact scope and focus of these activities will be determined on a project-specific basis during remedial design. Consideration of habitat function and enhancement of fisheries resources is required under this SOW to meet cleanup objectives and comply with ARARs, including the Clean Water Act, Endangered Species Act, and the Puyallup Tribe of Indians Settlement Act of 1989.

C. Mouth of Hylebos Waterway Problem Area

The 1989 ROD and 2000 ESD specified confinement as a primary component of the sediment cleanup remedy, and identified in-place capping and nearshore disposal as practicable options for portions of the Hylebos Waterway cleanup, including the Mouth of Hylebos Waterway Problem Area. In-place capping, which involves containment and isolation of contaminated sediment by placing clean material on top of existing substrate, will be used to remediate nearshore embankment areas in this area where removal is not practicable. Nearshore disposal involves removal (i.e., dredging) of sediment followed by confined disposal in the nearshore environment.

Dredging will occur largely within open access areas of the waterway. Dredged sediment not suitable for open-water disposal or beneficial reuse will be confined in the Blair Waterway Slip 1 nearshore confined disposal site (the "NCD Site"). Area 5106 Sediment, depicted on Figure 1, will be treated pursuant to a separate order prior to disposal in the NCD Site. The cleanup areas shown in Figures 1, 2 and 3, and described in more detail in subsequent sections of this SOW, represent the cleanup plan of the 2000 ESD, which is subject to remedial design as approved by EPA and remedial action under EPA oversight under this SOW.

1. PSDDA Testing and Disposal

EPA's 2000 ESD encouraged open-water Puget Sound Dredge Disposal Analysis (PSDDA) disposal or beneficial reuse of qualifying sediment. Sediments determined to be suitable for PSDDA disposal or beneficial reuse will be managed under existing authorities of the Puget Sound Dredge Material Management Program (DMMP).

In 2000, Respondents performed PSDDA testing of dredged material management units (DMMUs) in various areas of the Mouth of Hylebos Waterway Problem area, under the supervision of the DMMP. Results of the PSDDA sampling and analysis, including confirmatory biological testing, are provided in the Hylebos Waterway Phase I PSDDA Suitability Report (Anchor 2000), approved by the DMMP in 2001. Suitability determinations are summarized in Figure 3. Those DMMUs that comply with PSDDA open-water disposal or beneficial reuse criteria will be managed through the DMMP and disposed of at an open-water disposal site permitted by the DMMP agencies. However, all design and dredging of material suitable for open-water disposal will be reviewed and approved by EPA as part of this SOW. This is being done to accomplish a complete cleanup of the Mouth of Hylebos Waterway Problem Area, and to ensure that only those sediments requiring confined disposal are contained in the NCD Site.

2. Blair Slip 1 Nearshore Confined Disposal Site ("NCD Site")

If used as a disposal site under this SOW, Respondents will design, construct, maintain and monitor the NCD Site subject to the terms of this SOW. Consistent with the 2000 ESD, the design of the NCD Site shall include the following elements:

- a) A berm will be constructed across the face of Slip 1.
- b) Sediment from the Hylebos Waterway Problem Area requiring confined disposal including treated Area 5106 sediment, and sediment to be addressed by other parties from other areas of the CB/NT Site designated by the Respondents and approved by EPA, shall be placed in the NCD Site. Sediment from CB/NT areas may include up to 100,000 cubic yards (cy) from the Middle Waterway in the CB/NT Site. Sediment from areas outside of the CB/NT Site may be placed in the NCD Site subject to receipt by Respondents of all necessary government approvals. However, placement of non-CB/NT sediment must be compatible with timely completion of the Hylebos Waterway cleanup. Sediment requiring confined disposal shall be filled to +9 feet MLLW where it will remain in a saturated state.
- c) A cap will be placed from the top of the confined sediments to the ground surface, and will include an impervious cover to provide water quality protection.

- d) The NCD Site will be designed, at a minimum, to accommodate all sediment dredged under this SOW from the Mouth of Hylebos Waterway Problem Area (other than sediment approved for PSDDA disposal). The NCD Site may also be designed to include the Middle Waterway sediments as agreed to between Occidental Chemical Corporation, the Port of Tacoma and the Middle Waterway Action Committee.

3. Mouth of Hylebos Waterway Problem Area Open Access Dredge Areas

Previous investigations and preliminary engineering evaluations of the Mouth of Hylebos Waterway Problem Area are contained in the Hylebos Waterway Pre-Remedial Design Evaluation Report (PRDE Report), approved by EPA in November 1999. Consistent with the PRDE Report and the 2000 ESD, sediment requiring confined disposal shall be dredged and disposed of in one of the disposal sites. Areas to be dredged are shown in Figure 1. Wherever practicable, sediment will be dredged to below the native sediment interface. Performance monitoring will be undertaken, and additional dredging completed as necessary, to ensure removal of sediment exceeding applicable SQOs. Dredging and performance monitoring requirements are described in Section III.B below, and shall be detailed in the CQAP and OMMP, as appropriate.

4. Embankment Cleanups

The embankment areas to be addressed in the Mouth of Hylebos Waterway Problem Area under this SOW are:

- a) The Port Industrial Yard Embankment (SMA 531).
- b) The Parcel 4 Embankment (SMA 541)
- c) City of Tacoma (SMA 402)
- d) Taylor Way Properties (SMA 431)
- e) Buffelen (SMA 341)
- f) Murray Pacific (SMA 342)
- g) Sound Refining (SMA 432)
- h) Port of Tacoma (formerly Wasser Winters) Embankment (SMA 103)
- i) Puyallup Tribe (SMA 123)

Respondents shall perform the embankment cleanup actions required under this SOW to ensure that performance standards are achieved for these areas of the Hylebos Waterway. To the extent that individual property owners request design elements not covered by this SOW, the time lines and coordination for the embankment cleanup with respect to items outside the scope of this

SOW shall be identified in the RA Work Plans and addressed in other deliverables as necessary to ensure the sediment remedial action is conducted in compliance with this SOW and the remedial action schedule.

The appropriate remedial action (capping or dredging) for the embankment actions described above will be evaluated in the remedial design deliverables submitted under this SOW.

5. Natural Recovery Areas

Natural recovery has been selected for specific portions of the Hylebos Waterway as an acceptable remediation approach at locations where sediments are marginally contaminated, are likely to recover to SQOs within the ten (10) year time frame specified in the ROD, and are located in areas with a low potential for future exposure of subsurface contamination. At the CB/NT Site, EPA considers marginally contaminated sediments as those with chemical concentrations less than the second lowest Apparent Effects Threshold (AET) value (the SQO is set at the lowest AET) or biological test results that do not exceed the minimum cleanup level (MCUL) values under Washington State Sediment Management Standards (SMS). Numeric AET chemical concentration values are those specified in the 1989 ROD, while biological MCUL criteria are those specified in SMS regulations. Where PCBs are present, marginally contaminated sediments are those with PCB concentrations below 450 ppb as identified in the 2000 ESD.

The PRDE Report predicted that the Chinook Marina in Segment 5 would naturally recover within the 10 years following active remediation of the adjacent waterway. Respondents will monitor this area to verify compliance with performance monitoring criteria summarized in Table 1 (including optional biological monitoring; see Table 2). If future monitoring data indicate that natural recovery will not or does not occur within the next 10 years, the need for enhanced natural recovery and/or active sediment remediation will be reassessed with EPA, consistent with the 2000 ESD. The scope of long-term monitoring and appropriate response actions will be established in the OMMP.

The PRDE Report also predicted that several areas within Segment 3 and 4 would naturally recover within the 10 years following active remediation of the adjacent waterway. Performance monitoring will be performed to verify compliance with criteria summarized in Table 1 (including optional biological monitoring; see Table 2). If future monitoring data indicate that natural recovery will not or does not occur within the next 10 years, the need for enhanced natural recovery and/or active sediment remediation will be reassessed by the Respondents and EPA, consistent with the 2000 ESD. The scope of long-term monitoring and appropriate response actions will be established in the OMMP.

As part of remedial design, Respondents may choose to address natural recovery areas through active remediation rather than rely on natural recovery and the long-term monitoring performance monitoring required for natural recovery.

D. Coordination with Occidental Non-Time Critical Removal Actions

EPA has identified two non-time critical removal actions related to the former Occidental facility located at the Mouth of Hylebos Waterway Problem Area. These actions were studied in two Engineering Evaluation/Cost Analysis (EE/CA) documents prepared under a separate Administrative Order on Consent No. 10-97-0011-CERCLA. Under this SOW, coordination with the Area 5106 removal action and Occidental Embankment removal action is required.

1. Area 5106 Removal Action

Under a separate unilateral administrative order, Occidental and the current owner of the facility are required to implement Area 5106 sediment removal actions, including dredging controls, monitoring, slurry aeration treatment, disposal, monitoring, and implementation schedule elements, consistent with EPA's July 2001 Action Memorandum, the UAO and and/its SOW.

Area 5106 sediments are located adjacent to portions of the former Occidental Chemical facility and the Port of Tacoma property, extending from 0 MLLW approximately 200 feet into the Hylebos Waterway. Area 5106 Sediment will be removed to the horizontal and vertical limits set forth in the EE/CA (July 2000) approved by EPA. These boundaries were determined during the Area 5106 Sediment Characterization, and conservatively represent the outer limits of Area 5106 Sediment.

The cleanup objective for the Area 5106 Removal Action is the removal, treatment and disposal of sediments that require treatment prior to disposal in a nearshore fill. Since it is currently assumed that disposal may be accomplished in Blair Slip 1, all work done under this SOW must be coordinated with that effort. The schedule contained in this SOW reflects coordinated schedules with the 5106 Removal Action. If Blair Slip 1 is not used as a disposal site, EPA will amend the schedule, as necessary.

2. Occidental Embankment Removal Action

The Occidental Embankment, generally depicted in Figure 1, extends from the northeast boundary of the property at 605 Alexander Avenue (the "Pioneer property) to the southeast boundary of the adjacent property at 709 Alexander Avenue (formerly the PRI property).

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Previous investigations and engineering analyses of this action are summarized in a July 2001 EE/CA approved by EPA.

The cleanup objective for the Occidental Embankment removal action is to prevent human and marine receptors from contacting bank materials, and to prevent the migration of hazardous substances, pollutants, or contaminants from the bank at concentrations in excess of SQOs (for sediment) and marine water quality criteria (for the water column). This work will be completed under a separate order and SOW. However, Respondents must, in implementing the remedial action under this SOW, coordinate with the removal action to ensure proper construction sequencing suitable to both actions.

III. PERFORMANCE STANDARDS

The Respondents shall adhere to the following performance standards for the design and implementation of the Mouth of Hylebos Waterway Problem Area RD/RA. These performance standards, as stated in the 2000 ESD, or elsewhere, are consistent with the cleanup objectives and are necessary to ensure that the remedy is protective of human health and the environment, and complies with Applicable or Relevant and Appropriate Requirements (ARARs). Performance standards shall include cleanup standards, standards of control, quality criteria, and other substantive requirements, criteria, or limitations including all ARARs set forth in the 1989 ROD, 1997 and 2000 ESDs, this SOW, and/or UAO, and approved deliverables under this SOW.

Respondents shall address these performance standards in remedial design and shall identify additional performance standards and methods necessary to successfully implement the remedial action, including performance standards to monitor the long-term effectiveness of the remedial action and mitigation areas.

A. Cap Requirements

One of the remedial actions selected in the 1989 ROD and included in the preliminary cleanup plans for the Hylebos Waterway is capping. Respondents shall follow EPA guidance, "Guidance for *In-situ* Subaqueous Capping of Contaminated Sediments," September 1998, Reference EPA 905-B6-004, for the design and construction of capped areas.

In the remedial design, Respondents shall evaluate each embankment SMA on a property-by-property basis to identify a final design, either capping or dredging. For each property, Respondents' basis for design shall address the following factors:

- protectiveness of the proposed cap,
- compatibility with current and anticipated future land use,

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- property owner's willingness to implement use restrictions on the capped area and/or ensure such restrictions will run with the land,
- engineering constraints, and
- avoidance and/or minimization of habitat impacts and identification of appropriate mitigation under CWA Section 404, and compliance with Endangered Species Act measures that may be identified.

EPA intends to maintain the integrity and effectiveness of any capped area over contaminated sediments through requirements for construction, long-term monitoring, and maintenance, including the following:

2. Caps will have a minimum thickness of three (3) feet unless an alternative thickness is demonstrated to be consistent with "Guidance for *In-situ* Subaqueous Capping of Contaminated Sediments," and/or otherwise approved by EPA. Caps will be constructed to address adverse impacts through four primary functions:
 - a. Physical isolation of the contaminated sediment from the ecological receptors;
 - b. Complete confinement and stabilization of contaminated sediments, preventing resuspension and transport to other locations within the waterway;
 - c. Reduction of chemicals transported through the groundwater pathway to levels that will not impact surface sediments (defined as the "biologically active zone" where most sediment-dwelling organisms live) above the SQOs, and will not impact surface water at levels exceeding background concentrations or marine chronic water quality criteria;
 - d. Provide a cap surface that promotes colonization by aquatic organisms, unless it is demonstrated not to be practicable.
3. Long-term monitoring of the cap may include visual inspection, bathymetric survey, sediment deposition monitoring, chemical monitoring, and biological monitoring. The monitoring requirements will be specified in the OMMP.

Respondents shall demonstrate that all capped areas are completed in accordance with these performance standards. The methods for achieving the objectives for the capped areas shall be set forth in the Design Report. Verification of performance standards shall be documented in the CQAP and the OMMP, as appropriate. As-builts shall be provided for each capped SMA in the Remedial Action Construction Report.

B. Dredging and Confined Disposal

Performance standards for dredging and the NCD Site shall be consistent with the CB/NT ROD and ARARs including the Clean Water Act, Rivers and Harbors Act, and Endangered Species Act requirements. Under this SOW, the Mouth of Hylebos Waterway Problem Area, including the NCD Site will be subject to construction quality assurance and long-term monitoring to ensure that the selected remedy remains protective, and that applicable water quality standards are not exceeded beyond the surface water mixing zone identified for in-water activities (e.g., capping, dredging, and disposal in the NCD Site) and outside of the NCD Site during and after construction.

Section 401 of the Clean Water Act requires that both dredging and dredged material disposal (including dewatering) operations shall not violate applicable effluent or water quality standards. EPA, working with Ecology, will be responsible for certifying during remedial design that such operations will comply with this requirement. This determination allows for the designation of mixing zones within which standards may be exceeded, but beyond which applicable standards must be met. While dredging and disposal operations conducted as part of a remedial action within a CB/NT problem area do not require a formal Section 401 water quality certification from Ecology, these operations must comply with the substantive requirements of such certification, including specified monitoring and reporting requirements identified by EPA.

The mixing zone utilized during dredging actions and disposal in the NCD Site (including temporary discharge of dewatering fluids as appropriate), will require a water-quality certification from EPA. Respondents shall submit water quality monitoring plans as part of this SOW.

Respondents shall design and implement the dredging of designated Sediment Management Areas necessary to achieve SQO cleanup levels in those areas EPA has determined will not naturally recover within 10 years. Wherever practicable, sediment will be dredged to below the native sediment interface. Performance monitoring will be undertaken, and additional dredging completed as necessary, as detailed in the CQAP to be approved by EPA. The need for additional dredging will be determined based on a comparison with SQOs, and with a statistical comparison of performance monitoring data with SQOs, surrounding surface chemistry, and SRALs. The sediment quality monitoring and decision framework for long-term effectiveness will be detailed in the OMMP.

Contaminated sediment shall be dredged and disposed of in the NCD Site and/or upland regional landfill that is authorized to accept the material. As-builts of all dredged surfaces shall be

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provided to EPA in the Remedial Action Construction Report. Respondents shall document to EPA quantities (in-place volumes), and disposal location (the NCD Site or upland regional landfill) for each SMA dredged from the Mouth of Hylebos Waterway Problem Area.

The methods for achieving the objectives for dredged areas and disposal Sites addressed under this SOW shall be set forth in the Design Report, the CQAP and the OMMP, as appropriate. Verification that performance standards, including SQOs, have been achieved shall be documented in the pre-final construction reports, and the Remedial Action Completion Report, as appropriate.

C. Natural Recovery

For those areas selected for natural recovery, Respondents shall prepare: (1) monitoring plans, (2) identify triggers for initiating additional response actions if the monitoring indicates natural recovery will not succeed in the ten (10) year time frame, and (3) specify additional response actions for active remediation if monitoring indicates natural recovery will not occur by year ten (10). These elements shall be primarily addressed in the OMMP for the Site and other deliverables, as appropriate. Natural recovery monitoring will be performed until cleanup objectives are achieved.

D. Subsurface Contamination

The cleanup plan for the Mouth of Hylebos Waterway Problem Area included in this SOW (Figures 1 and 2) includes all areas of subsurface contamination that EPA determined had a high to moderate potential for future exposure. Contaminated subsurface sediments that EPA determined had a low potential for exposure will require long-term monitoring under this SOW. Because exposure of contaminated subsurface sediments may occur during the cleanup by dredging adjacent areas, under this SOW, Respondents shall prepare a final remedial design and implement the remedial action to ensure that contaminated subsurface sediment is not exposed and that SQOs are achieved at the surface of every dredge cut. Where EPA determines it is not practicable to achieve SQOs at the face of a dredge cut, Enhanced Natural Recovery or alternatives other than dredging may be proposed by Respondents.

Because exposure of contaminated subsurface sediments may occur after construction of the remedial action through physical processes, such as storms or ship scour, or through future dredging or excavation, under this SOW Respondents shall conduct long-term monitoring in these areas as set forth in an approved OMMP. This element of long-term monitoring shall be designed, in part, to detect recontamination from buried subsurface contamination.

E. Conservation Measures and Compensatory Mitigation

Respondents shall take all appropriate measures during remedial design, construction, and site maintenance to avoid and minimize adverse impacts to the aquatic environment resulting from implementation of the remedial action. As set forth in the CB/NT Biological Assessment (BA) prepared by EPA, and in the 2000 ESD, a range of conservation measures are required by EPA to ensure that critical habitat for listed species is protected by the remedial action. Conservation measures for work in the Mouth of Hylebos Waterway Problem Area include:

- Design of capping actions to avoid conversion of aquatic habitat to upland in the Mouth of Hylebos Waterway Problem Area, or inclusion of compensatory mitigation measures if conversion is unavoidable;
 - Design of dredging and capping actions to avoid conversion of intertidal habitat to subtidal habitat in the Mouth of Hylebos Waterway Problem Area, or inclusion of compensatory mitigation measures if conversion is unavoidable;
 - Timing restrictions for in-water work to avoid fish-critical activity periods, such that no in-water work will occur during designated fish windows;
 - Substantive compliance with water quality standards as specified in a water quality certification to be issued by EPA;
 - Addition of select substrates (fish mix) as part of capping to assist in providing suitable habitat for prey items of juvenile salmonids; and
 - Incorporation of specific measures (e.g., Best Management Practices) into the design, to reduce the potential for construction-related impacts to listed species or their habitats.
- Specific design measures will be reviewed and approved by EPA.

As part of remedial design under this SOW, Respondents shall prepare Addenda to the CB/NT BA, which shall incorporate additional design information. Additional conservation measures beyond those identified by EPA in the CB/NT BA (July 2000) may be identified by EPA in consultation with the National Marine Fisheries Service and the U.S. Fish and Wildlife Service and shall be incorporated into the final design documents under this SOW.

Section 404 of the Clean Water Act requires compensatory mitigation for unavoidable loss of wetlands and aquatic habitat. To the extent that conversion of aquatic habitat to upland, or intertidal habitat to subtidal habitat is unavoidable within the Mouth of Hylebos Waterway Problem Area, and that compensatory mitigation is determined to be necessary, Respondents shall submit compensatory mitigation plans to offset unavoidable losses to aquatic habitat. Compensatory mitigation shall contribute toward the recovery of ESA-listed species, consistent with the conservation measures in the BA and the August 2000 ESD performance standards for mitigation.

The filling of Slip 1 has been undergoing permit review as part of a Port of Tacoma development project (the Terminal 3/4 Northern Expansion Project). The BA prepared for that project (Pacific International Engineering 2001) addresses the potential effects associated with filling Slip 1. However, the Terminal 3/4 Northern Expansion Project currently calls for filling Slip 1 with clean dredged material. In addition, use of Slip 1 as the NCD Site for this action also requires minor modifications to the design of the closure berm that will require specific construction activities. If Slip 1 is used as the disposal site under this SOW, the use of Slip 1 as a disposal site for contaminated sediments will occur under CERCLA authorities subject to EPA review and approval of Slip 1 NCD design, including required mitigation and long-term monitoring. Respondents will coordinate with the U.S. Army Corps of Engineers to determine what, if any, elements of the Port of Tacoma's Terminal 3/4 Project beyond the filling of the slip must be permitted by the U.S. Army Corps of Engineers.

IV. WORK TO BE PERFORMED BY RESPONDENTS

The scope of work for this remedial design and remedial action includes the following key components (assuming use of Blair Slip 1 disposal site):

- Design and construct a nearshore confined disposal site at Blair Slip 1 (the NCD Site) or prepare a design for upland disposal in a regional landfill;
- Design and construct mitigation for impacts to filling Blair Slip 1;
- Design and construct embankment remedial actions listed in Section II.5 of this SOW, either by capping or by dredging and disposal;
- Design and dredge contaminated subtidal sediments in the Mouth of Hylebos Waterway Problem Area for disposal in NCD Site (or other suitable disposal site);
- Coordinate with Area 5106 Respondents regarding construction sequencing to allow for placement of Area 5106 Sediments in the NCD (Blair Slip 1);
- Coordinate with Respondents for Occidental Embankment removal action to ensure construction sequencing between projects is compatible (e.g., dredging of subtidal sediments under this SOW may be necessary prior to embankment actions);
- At the option of Respondents, place sediments from the Middle Waterway in the NCD Site, pursuant to an agreement between Occidental, the Port of Tacoma, and the

Middle Waterway Action Committee, consistent with the final ESD for the Middle Waterway (February 2002) and with the approved schedule of this SOW;

- Design and construct habitat mitigation for unavoidable impacts from remedial actions in the Mouth of Hylebos Waterway Problem Area; and
- Perform construction monitoring and long-term monitoring, including, but not limited to natural recovery and mitigation area monitoring as appropriate.

To accomplish this scope of work the remedial design/remedial action shall consist of the following five (5) tasks. Respondent shall be responsible for implementing additional work elements necessary for successful implementation of the Mouth of Hylebos Waterway Problem Area remedial action. All plans are subject to EPA approval.

Task 1: Remedial Design Work Plan

Task 2: Remedial Design

- A. Preliminary (30%) Design (Segments 3 and 4 only)
- B. Draft (90%) Design
- C. Final (100%) Design

Task 3: Remedial Action Work Plan

Task 4: Remedial Action/Construction

- A. Pre-construction Inspection/Meeting
- B. RA Progress Meetings
- C. Pre-final Construction Inspection
- D. Final Construction Inspection
- E. Reports
 - 1. Remedial Action Construction Report
 - 2. Final Remedial Action Report

Task 5: Performance Monitoring and Construction Quality Assurance

Task 6: Long-term Operation, Maintenance & Monitoring

Additional details on each task are provided below. All documents, including work plans, reports, and memoranda, listed in Section V of this SOW are subject to EPA review and approval. Unless otherwise agreed by EPA and Respondents, a draft version of each document shall be submitted to EPA for review and comment. Subject to and in accordance with Section XIV of the UAO, upon receipt of EPA's comments on a draft document, the Respondents shall submit to EPA a revised final document that incorporates EPA's modifications or summarizes and addresses EPA's concerns. All deliverables submitted in response to EPA's comments shall include a transmittal that responds directly to each comment, and identifies how the comment

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was addressed in the deliverable. This SOW also specifies submittal of certain documentation (e.g., construction progress reports, monthly progress reports) that will be used by EPA for informational purposes only but will not be formally approved by EPA.

Respondents may submit separate remedial design deliverables for discrete elements of the remedial action, subject to EPA approval. The following shall be considered discrete elements of the remedial action under this SOW for purposes of submitting separate design deliverables; dredging of a Sediment Management Area (SMA) or segregate group of SMAs comprising a portion of the waterway; and construction and completion of the NCD Site. Where practicable, multiple elements of the remedial action will be combined in the design deliverables. In any event, the deliverables will include a discussion of the interrelationships between discrete design elements.

Task 1: Remedial Design Work Plan

Within fifteen (15) days after the effective date of the UAO, Respondents shall submit a Remedial Design Work Plan in accordance Section IX. A. of the UAO and Section V (Schedule of Milestones and Deliverables) of this SOW. The RD Work Plan shall summarize the overall management strategy for performing the design, construction, operation, maintenance, and monitoring of remedial actions for EPA to review and approval. The plan shall document the responsibility and authority of all organizations and key personnel involved with the implementation and shall include a description of qualifications of key personnel directing the remedial design, including contractor personnel. Contact information (addresses, phone numbers, and e-mail) and general responsibilities for key personnel shall be provided. The Work Plan shall also contain a schedule of remedial design activities.

In addition to describing the overall management strategy and identifying additional data needs as described above, Respondents shall make all reasonable efforts to communicate to the public and business community and coordinate work under this SOW to minimize disruption of normal use of the Hylebos Waterway and adjacent project areas. In the RD Work Plan, Respondents shall address scheduling and coordination of work under this SOW with other in-water work or navigation near the project area that may occur. Respondents shall identify any known development projects anticipated on or near intertidal properties that are subject to work under this SOW.

One objective in implementing the requirements of this SOW is to maximize remedial action that can reasonably occur in the 2002 dredging season. Section V of this SOW requires pier demolition and PSDDA dredging to occur in 2002. However, in preparation of the Remedial Design Work Plan, the Respondents to this Order shall propose an implementation strategy that

identifies additional remedial action elements to be accomplished or provides an explanation of limitations for the amount of remedial action that can be accomplished in 2002.

Alternatively, if Respondents do not want to use Blair Slip 1 as a disposal Site for contaminated sediments addressed under this SOW, Respondents must prepare a remedial design identifying another acceptable disposal option as specified in the 2000 ESD and ensure that remedial dredging and disposal will begin in 2003. Respondents shall specify in the RD Work Plan the disposal site to be used in implementing this SOW.

Task 2: Remedial Design

The remedial design is generally defined as those activities to be undertaken to develop the final plans and specifications, general provisions, special requirements, and all other technical and procurement documentation necessary to fully implement the remedial action as described in the CB/NT ROD and this SOW. Respondents shall prepare construction plans and specifications to implement the remedial actions within the Mouth of Hylebos Waterway Problem Area as described in the ROD and this SOW. Plans and specifications shall be submitted in accordance with the schedule set forth in Section V below. Subject to approval by EPA, Respondents may submit more than one set of design submittals reflecting different components of the remedial action. All remedial design work, including plans and specifications, shall be developed in accordance with EPA's Superfund Remedial Design and Remedial Action Guidance (OSWER Directive No. 9355.0-4A) and shall demonstrate that the remedial action shall meet all objectives of the ROD, CD, and this SOW, including all performance standards. Respondents shall meet regularly with EPA to discuss design issues.

A. 90% Design/Final Design for Segment 5 PSDDA Dredging and Pier Demolition in Blair Slip 1.

EPA has received a 90% design for open access dredging in Segment 5 and building Blair Slip 1. Priority in review and approval will be given to complete design components so as to perform demolition of the piers in Blair Slip 1 and conduct PSDDA dredging in 2002. Final design for Segment 5 and Blair Slip 1 will be accomplished in accordance with Subsections C & D of this section of the SOW, and in accordance with the schedule contained in Section V of this SOW.

B. Segment 3 and 4 Preliminary (30%) Design Deliverable

Within one hundred (100) days after the effective date of the UAO, Respondents shall submit the Draft Segment 3 and 4 Preliminary (30%) Design Deliverable for discrete elements of Segments 3 and 4 described above, in accordance with the UAO and Section V (RD/RA Schedule of

Deliverables & Milestones) of this SOW. The Draft Segment 3 and 4 Preliminary Design Deliverable will present, for EPA review and approval, the results of remedial design sampling and analysis, and a preliminary dredge plan for identified action areas (SMAs) within Segments 3 and 4, as set forth in the August 2000 ESD. Within sixty (60) days after receipt of EPA's comments on this deliverable, Respondents shall submit a Draft (90%) Design Report for discrete elements of Segment 3 and 4 remedial actions.

C. Draft (90%) Final Design

Respondents shall submit the Draft Final Design Report when the design effort is approximately ninety (90) percent complete. The following elements will be discrete design deliverables that are each subject to the schedule for submission requirements identified in Section V of this SOW:

- Pier 25 Embankment (SMA 531)
- Segment 5 Open Access Dredging
- Segments 3 and 4

Other discrete design elements may be proposed in the RD Work Plan and approved by EPA under this SOW. The Draft Design submittals shall include or discuss, at a minimum, the following:

1. Summary of results of pre-design field sampling. Extensive pre-remedial design sampling was completed within the Mouth of Hylebos Waterway Problem Area from 1993 through 2001. The Draft Design Report shall include a brief summary of the work completed, identifying key documents, and summarizing key conclusions and sampling results. The summary and key conclusions shall clearly distinguish between data/interpretations previously approved by EPA and new data (post-1999) presented for EPA review and approval;
2. Basis for Design Report, with detailed design assumptions, parameters, design restrictions and objectives, including but not limited to:

General Elements:

- a. descriptions of the analyses conducted to select the design approach, including a summary and detailed justification of design assumptions;
- b. order in which dredging and capping will occur, addressed by Sediment Management Area;

- c. technical parameters and essential supporting calculations (at least one sample calculation presented for each significant or unique design calculation) upon which the design will be based, including but not limited to design requirements for each active remedy (e.g., dredging, capping);
- d. access and easement requirements, including an evaluation of the most appropriate Waterway Problem Area use restrictions for each element of the remedial action to ensure long-term effectiveness;
- e. coordination with other in-water work or navigation and commerce;
- f. permit requirements or substantive requirements of permits;
- g. preliminary construction schedule, including contracting strategy;
- h. plans and protocols for capping or dredging around pilings, piers, and other structures;

Capping Elements:

- i. appropriate physical and chemical characteristics of materials to be used for sediment capping;
- j. method for identifying and testing clean source material, including acceptance criteria for such sediment;
- k. cap placement techniques;
- l. determinations regarding potential propeller-driven erosion for capped area;
- m. selection of cap material suitable for colonization by aquatic organisms;
- n. Performance standards in Section III of this SOW;

Dredging Elements:

- o. methods and requirements for how dredged sediments will be handled, transported, and disposed;
- p. proposed staging, material handling, or dewatering location(s) required;
- q. design dredge depth and overcut allowances;
- r. dredged material volumes;
- s. dredging techniques;
- t. analysis of dredge cuts to ensure contaminated side slope do not remain exposed after dredging;
- u. if appropriate, method and location for dewatering dredged sediments and disposal of associated water;
- v. Performance standards in Section III of this SOW.

3. Complete set of drawings and specifications defining the detailed design;
4. Draft CQAP, including description/outline of proposed cleanup verification methods for remedial action construction (e.g., inspection activities and survey requirements), including compliance with ARARs. The CQAP shall also describe contractor/subcontractor qualifications, documentation and reporting, and various remedial action construction elements (e.g., dredging, capping, NCD Site, and fish salvage and protection). The CQAP will also describe water quality control measures to be specified in a Water Quality Monitoring Plan (e.g., inspection and oversight), that will occur during water quality monitoring activities to confirm that such activities are conducted consistent with requirements to be specified in the plans and specifications;
 - a. Water Quality Monitoring Plan. The plan shall include the following minimum elements: monitoring schedule, sampling locations, intervals, parameters, analytical methods, key contacts, reporting requirements (including daily reports), daily contacts for notifications of all exceedances, result summaries, and draft and final reports.
5. Addendum to EPA's "Biological Assessment, Commencement Bay/Nearshore Tidelands Superfund Site," July 2000, addressing the performance standards in Section III.E. evaluating:
 - a. Impacts to filling Blair Slip 1. Respondents may submit to EPA the September 2001 BA that was submitted to the Corps to avoid redundant work effort. Appropriate modifications will be made to the document to reflect that contaminated sediment will be used for fill material consistent with this SOW. The compensatory mitigation plan for impacts associated with the filling of Blair Slip 1 shall also be submitted to EPA for approval;
 - b. Net changes to intertidal and shallow subtidal habitat resulting from final dredging and capping designs in the Mouth of Hylebos Waterway Problem Area and identifying the need for mitigation of unavoidable impacts. If mitigation is necessary, a compensatory mitigation plan shall be submitted to EPA that also addresses the performance criteria in Section III.E. The Biological Assessment shall identify the proposed mitigation project for EPA approval;

6. Draft Compensatory Mitigation Plan. Respondents shall submit a compensatory mitigation plan including design drawings and details. The mitigation plan shall address the performance criteria in Section III.E.
7. Draft Operation, Maintenance, & Monitoring Plan (OMMP) (See Task 6);
8. Capital and Operation and Maintenance Cost Estimate (accuracy of +15 percent and -10 percent). This cost estimate shall refine the Pre-Remedial Design cost estimate to reflect the detail presented in the Draft Design;
9. Project Schedule for the construction and implementation of the remedial action that identifies timing for initiation and completion of all critical path tasks. This schedule shall incorporate construction sequencing considerations between this SOW and the Area 5106 removal action and the Occidental embankment area removal action.

D. Final (100%) Design

Within forty-five (45) days of receipt of EPA's comments on the draft (90%) design, Respondents shall submit the Final Design that is one hundred (100) percent complete. The Final Design shall fully address all comments made to the Draft (90%) Design and shall include reproducible drawings and specifications suitable for bid advertisement. The final project schedule submitted as part of the Final Design shall include specific dates for major milestones and completion of the project. As described in Task 2 below, certain elements of the design will be finalized as part of the subsequent Remedial Action Work Plan deliverable.

The project plans and specifications included with the Final Design shall include detailed descriptions of sampling activities, such as water quality performance sampling. The requirements for quality assurance sampling activities including the sampling protocols, sample size, locations, frequency of testing, acceptance and rejection data sheets, problem identification and corrective measures reports, evaluation reports, acceptance reports, and final documentation will be described. The CQAP will address inspections, surveys, oversight and reporting as described above in Task 1, B.4. Detailed procedures for sediment and water quality sampling and analysis (post-dredge confirmatory and long-term) shall be presented in the OMMP. The OMMP shall include sediment sampling operations manual, quality assurance project plans, and health and safety plans for sediment sampling activities. Existing EPA-approved (HCC) Quality Assurance Project Plans (QAPPs) and other EPA-approved supporting documents may be referenced or included as appropriate.

Task 3: Remedial Action Work Plan

The Respondents shall submit a single Remedial Action Work Plan which includes a detailed description of all remediation and construction activities, including how those construction activities are to be implemented by Respondents and coordinated with EPA (e.g., site-monitoring, material staging and handling). When describing implementation of the remedial action, Respondents shall identify discrete elements of the remedial action for purposes of monitoring construction activities as they occur. The following shall be considered the limit of discrete elements of the remedial action under this SOW: a specific embankment SMA; dredging of a SMA or segregable group of SMAs comprising a portion of the waterway; and construction and completion of the NCD Site. The RA Work Plan shall include a project schedule for each major activity and submission of deliverables generated during the remedial action. The project schedule submitted in the RA Work Plan shall clearly describe the interrelationship between various discrete portions of the remedial and removal actions within this SOW. The Respondents shall submit a Remedial Action Work Plan in accordance with Section IX. B of the UAO and Section V of this SOW.

Respondents shall submit the following deliverables with submission of the Remedial Action Work Plan (unless previously submitted and approved by EPA):

1. Final Construction Quality Assurance Plan (see Task 5 for detail);
2. Final Contractor submittals (e.g., Water Quality Monitoring Plan, Health and Safety Plan and Quality Assurance Project Plan addenda as appropriate) for remedial action construction activities;
3. Final OMMP (see Task 6).

Task 4: Remedial Action Construction

The Respondents shall implement the remedial action as detailed in the approved Final Design and Final Remedial Action Work Plan. The following activities shall be completed in constructing the remedial action.

A. Preconstruction Inspection and Meeting

The Respondents shall participate with EPA and the State in a preconstruction inspection and meeting to:

1. Review methods for documenting and reporting inspection data, and compliance with specifications and plans including methods for processing design changes and securing EPA review and approval of such changes as necessary;
2. Review methods for distributing and storing documents and reports;
3. Review work area security and safety protocol;
4. Demonstrate the construction management is in place, and discuss any appropriate modifications of the construction quality assurance plan to ensure that Site-specific considerations are addressed; and
5. Conduct a Site walk-about to verify that the design criteria, plans, and specifications are understood and to review material and equipment storage locations.

All inspections and meetings shall be documented by Respondent's designated contact and minutes shall be transmitted to all parties within seven (7) working days of the inspection or meeting.

B. RA Briefings and Progress Meetings

Respondents shall conduct RA briefings and progress meetings on a regular basis throughout the RA. Briefings shall be held on a weekly basis to discuss issues such as the results of ongoing water quality monitoring and field changes unless EPA and Respondents agree to a less frequent schedule. Progress meetings shall be held at least monthly unless EPA and Respondents agree to a less frequent schedule. Progress meetings shall be scheduled on the same day that weekly briefings occur, thus eliminating the need for additional briefings during that week. At a minimum, Respondents shall address the following at progress meetings:

- General progress of construction with respect to RA schedule;
- Problems encountered and associated action items;

- Pending design, personnel or schedule changes requiring EPA review and approval;
- Results of any RA verification sampling and associated decisions and action items.

C. Prefinal Construction Inspections

Within thirty (30) days after Respondents make preliminary determinations that construction is complete for each discrete element of the remedial action, as defined in the Final Remedial Action Work Plan, the Respondents shall notify EPA and the State for the purposes of conducting a prefinal inspection.

The prefinal inspections shall consist of a walk-through inspection of the entire completed remedial action element with EPA. The inspection is to determine whether the project element is complete and consistent with the contract documents and the Remedial Action Work Plan, to review compliance with the CQAP, and to review field changes and change orders, and verify that SQOs have been achieved. The Respondents shall certify that each discrete element of the remedy has been constructed to meet the purpose and intent of the specifications. Respondents shall complete re-testing where deficiencies are revealed. Within seven (7) days of the inspection, a prefinal construction inspection letter/report shall be submitted to EPA. The prefinal construction inspection report shall include a summary of the major CQAP results and field changes, as well as minutes from the inspection. The prefinal inspection report shall outline the outstanding construction items, actions required to resolve items, completion date for these items, and a proposed date for final inspection, and otherwise comply with Section IX of the UAO.

D. Final Construction Inspections

Within thirty (30) days after completion of any work identified in the prefinal inspection reports, the Respondents shall notify EPA and the State for the purposes of conducting a final inspection of each discrete remedial action element. The final inspection shall consist of a walk-through inspection of each discrete element of the remedial action by EPA and the Respondents. The prefinal inspection reports shall be used as a checklist with the final inspection focusing on the outstanding construction items identified in the prefinal inspections. Confirmation shall be made that outstanding items have been resolved. Resolution of all outstanding items should be documented in a Final Construction Letter/Report within thirty (30) days of the final inspection, which complies with Section IX of the UAO.

E. Reports

Respondents shall follow EPA guidance for preparing Remedial Action Reports described in "Close Out Procedures for National Priorities List Sites," EPA 540-R-98-016, OSWER Directive 9320.2-09A-P, PB98-963223, January 2000 in submitting the following reports.

1. Remedial Action Construction Report

The Respondents shall submit this report when the construction is complete for all discrete remedial action elements, but before all performance standards have been attained (i.e., prior to achieving natural recovery and long-term performance standards for mitigation).

Within thirty (30) days of the last successful final construction inspection, Respondents shall submit a Remedial Action Construction Report. In the report, a registered professional engineer and the Respondents' Project Coordinator shall state that the remedial action has been constructed in accordance with the design and specifications. The written report shall include as-built drawings signed and stamped by a professional engineer, and other supporting documentation to demonstrate the CQAP was followed. The report shall contain the following statement, signed by a responsible corporate official of each Respondent or the Respondents' Project Coordinator:

"To the best of my knowledge, after thorough investigation, I certify that the information contained in or accompanying this submission is true, accurate, and complete. I am aware there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

2. Remedial Action Completion Report

The Respondents shall submit this report after construction is complete and all performance standards have been attained (including performance standards for natural recovery and mitigation areas, as applicable), but where OMMP requirements will continue to be performed.

Within thirty (30) days of a successful demonstration that all performance standards have been attained, Respondents shall submit a Remedial Action Completion Report. In the report, a registered professional engineer and a responsible corporate official or the Respondents' Project Coordinator shall state the remedial action has been completed in full satisfaction of the requirements of the UAO. The written report shall include a summary of all information (e.g.,

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long-term monitoring data) demonstrating performance standards not met (e.g., natural recovery) in the Remedial Action Construction Report have been obtained. The report shall also include documentation not previously submitted with the Remedial Action Construction Report verifying that performance standards, including SQO cleanup objectives, have been attained. The report shall contain the following statement, signed by a responsible corporate official of each Respondent or the Respondents' Project Coordinator:

"To the best of my knowledge, after thorough investigation, I certify that the information contained in or accompanying this submission is true, accurate, and complete. I am aware there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

Task 5: Performance Monitoring and Construction Quality Assurance

Performance monitoring shall be conducted to ensure that all performance standards are met, including cleanup verification methods and methods for determining compliance with performance standards and ARARs. The CQAP shall address performance standards related to the remedial action construction (e.g., inspections, surveys, oversight and reporting as described above in Task 1, B.4). Other confirmatory sediment sampling to demonstrate long-term achievement of SQOs throughout the Mouth of the Hylebos Waterway Problem Area and other long-term performance standards to be achieved after remedial action construction is completed (e.g., achievement of SQOs in natural recovery areas) shall be addressed in the OMMP. The post-construction sediment sampling results conducted under the CQAP will become the baseline for the OMMP described in Task 6. Existing EPA-approved (HCC) QAPPs and other supporting documents may be referenced as appropriate.

The documents listed in this section must be prepared and submitted consistent with in Section III of this SOW. The required content of each of these documents is described below.

A. Construction Quality Assurance Plan

Respondents shall submit in accordance with the schedule in section V of this SOW, a Construction Quality Assurance Plan (CQAP) that describes the specific components of the performance methods and quality assurance program that shall ensure that the completed project meets or exceeds performance standards and design criteria, and the project plans and specifications, including achievement of SQOs as defined in this SOW. As part of the CQAP, Respondents shall propose a sampling approach for verifying that SQOs have been achieved in Segments 3, 4, and 5. The draft CQAP shall be submitted with the Draft (90%) Design Report

and the final CQAP shall be submitted with the RA Work Plan. Consistent with preparation of discrete elements of the remedial design, Respondents may submit more the one CQAP for discrete portions of the remedial action to facilitate contracting the remedial and removal actions under this SOW. The CQAP(s) shall contain, at a minimum, the following elements:

1. Responsibilities and authorities of all organizations and key personnel involved in the design and construction of the remedial action, including EPA and other agencies.
2. Qualifications of the Construction Quality Assurance (CQA) Official. Establish the minimum training and experience of the CQA Officer and supporting inspection personnel.
3. Performance Standards and Methods. Describe all performance standards and methods necessary to ensure implementation of the remedial action construction, including mitigation as appropriate, in compliance with ARARs and identified Site-specific performance standards. Performance monitoring requirements shall be stated to demonstrate that best management practices have been implemented for dredging operations, transportation of dredged material and proper cap placement techniques.
4. Inspection and Verification activities. Establish the observations and tests that will be required to monitor the construction and/or installation of the components of the remedial action. The plan shall include the general scope and frequency of each type of inspection to be conducted. Inspections shall be required to measure compliance with environmental requirements and ensure compliance with all health and safety procedures.
5. Documentation. Reporting requirements for CQA activities shall be described in detail in the CQA plan. This shall include such items as daily summary reports, inspection data sheets, problem identification and corrective measures reports, design acceptance reports, and final documentation/storage. A description of the provisions for final storage of all records consistent with the requirements of the UAO shall be included.
6. Field Changes. Describe procedures for processing design changes and securing EPA review and approval of such changes to ensure changes conform to performance standards, ARARs, requirements of this SOW,

are consistent with Cleanup Objectives and are protective of human health and the environment.

7. Final Reporting. Identify all final CQAP documentation to be submitted to EPA in the Remedial Action Construction Report, or other deliverables and submissions.

Detailed procedures for water quality sampling and analysis described in the CQAP shall be presented in the plans and specifications, as appropriate. Existing EPA-approved (HCC) QAPPs and other supporting documents may be referenced or included, as appropriate.

B. Quality Assurance Project Plans

For a particular sampling event Respondents may propose to use an existing EPA-approved QAPP. The Respondents will identify whether any changes or additions are needed for each sampling effort. Regardless of whether Respondents utilize existing EPA-approved QAPPs or submit a new QAPP for a unique sampling event, the QAPP shall be consistent with the requirements of the EPA Contract Lab Program (CLP) for laboratories proposed outside the CLP. The QAPP shall at a minimum include:

Project Description

- Facility Location History
- Past Data Collection Activity
- Project Scope
- Sample Network Design
- Parameters to be Tested and Frequency
- Project Schedule

Project Organization and Responsibility

Data Management Plan

- Describe tracking, sorting, retrieving data
- Identify software for data storage,
- Minimum data requirements & data format
- Data backup procedures
- Submission of data in format(s) acceptable to EPA

Quality Assurance Objective for Measurement Data

- Level of Quality Control Effort

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- Accuracy, Precision, and Sensitivity of Analysis
- Completeness, Representativeness and Comparability

Sampling Procedures

Sample Custody

- Field Specific Custody Procedures
- Laboratory Chain-of-Custody Procedures

Calibration Procedures and Frequency

- Field Instruments/Equipment
- Laboratory Instruments

Analytical Procedures

- Non-contract Laboratory Program Analytical Methods
- Field Screening and Analytical Protocol
- Laboratory Procedures

Internal Quality Control Checks

- Field Measurements
- Laboratory Analysis

Data Reduction, Validation, and Reporting

- Data Reduction
- Data Validation
- Data Reporting

Performance System Audits

- Internal Audits of Field Activity
- Internal Laboratory Audit
- External Field Audit
- External Laboratory Audit

Preventative Maintenance

- Routine Preventative Maintenance Procedures and Schedules
- Field Instruments/Equipment
- Laboratory Instruments

Specific Routine Procedures to Assess Data Precision, Accuracy, and Completeness

- Field Measurement Data
- Laboratory Data

Corrective Action

- Sample Collection/Field Measurements
- Laboratory Analysis

Quality Assurance Reports to Management

C. Health and Safety Plan

The Respondents, or their contractors, shall develop and submit in accordance with the schedule in Section V of this SOW, health and safety plans which are designed to protect on-site personnel and area residents from physical, chemical, and all other hazards posed by this remedial action. The safety plan shall develop the performance levels and criteria necessary to address the following areas:

- Facility description
- Personnel
- Levels of protection
- Safe work practices and safeguards
- Medical surveillance
- Personal protective equipment
- Personal hygiene
- Decontamination—personal and equipment
- Site work zones
- Contaminant control
- Contingency and emergency planning, including SPCC
- Logs, reports, and record keeping

The safety plan(s) shall follow EPA guidance and all OSHA requirements as outlined in 29 C.F.R. 1910 and 1926. Respondents may utilize existing Health and Safety Plan project documents (e.g., pre-remedial design HASP) or other company/contractor HASPs provided that Respondents demonstrate the HASP has been modified, as necessary, or otherwise sufficiently addresses the activities covered by this SOW.

D. Field Sampling Plan

Respondents shall develop and submit in accordance with the schedule in Section V of this SOW, field sampling plan(s) (or equivalent documents/appendices) as described in "Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA", October 1988. The Field Sampling Plan(s) will supplement the QAPP and address all sample collection activities under this SOW.

Task 6: Operation, Maintenance & Monitoring

Respondents shall submit in accordance with the schedule in Section V of this SOW for EPA approval a single post-remedial action Operation, Maintenance, & Monitoring Plan (OMMP) covering all remedial actions in the in the Mouth of Hylebos Waterway Problem Area. The OMMP covers long-term operation, maintenance and monitoring activities after all elements of the remedial actions have been constructed. The objectives of the OMMP shall include:

- Confirmation that performance standards are achieved by the remedial action;
- Confirmation that SQOs are still maintained in areas dredged within the Mouth of Hylebos Waterway Problem Area;
- Confirmation that exposure of subsurface contamination has not occurred through physical processes such (e.g., through) storms or ship scour;
- Evaluation of the effectiveness of capped areas;
- Evaluation of the effectiveness of the nearshore confined disposal Site;
- Confirming natural recovery in designated areas within 10 years following completion of remedial actions in adjacent areas;
- Evaluation of long-term effectiveness of source control;
- Evaluation of long-term effectiveness of habitat mitigation; and
- Evaluation of leachability of treated Area 5106 material on other sediments in NCD Site.

The Respondents shall prepare an OMMP to cover both implementation and long-term maintenance and monitoring of the remedial action, including mitigation areas. A draft OMMP shall be submitted with the Draft (90%) Design. The final OMMP shall be submitted to EPA no later than the Remedial Action Work Plan submittal. The final OMMP shall address all comments made to the draft OMMP and will be subject to EPA approval. After results for each monitoring event are reported, the final OMMP will be reviewed and revised as necessary, under EPA direction and approval. The following types of monitoring may be included in the monitoring actions:

- bathymetry
- sediment chemistry
- confirmatory biological analyses (i.e., sediment bioassays or benthic infaunal abundance)
- groundwater chemistry at the NCD Site.
- seepage chemistry for specific SMAs (i.e., the Former Occidental/PRI embankment)
- fish tissue analysis

Respondents shall propose the appropriate monitoring elements necessary to achieve the specified monitoring objectives in this SOW for the remedial action. A rationale for the proposed monitoring actions shall also be included. However, long-term monitoring to ensure the effectiveness of the remedial action, including mitigation, will continue as long as contaminated sediments are left in place.

The OMMP shall be composed of the following elements:

1. Description of normal operation and maintenance:
 - a. Description of tasks to achieve each monitoring objective;
 - b. Description of tasks for maintenance;
 - c. Schedule showing frequency of each OMMP task
 - d. Summary table of OMMP activities for all activities (e.g., NCD, Segment 3, 4 & 5; embankments, mitigation, etc.)
2. Description of routine monitoring and laboratory testing:
 - a. Description of monitoring tasks;
 - b. Description of required data collection (including sample type, number, location and frequency), laboratory tests, and their interpretation;
 - c. Required quality assurance and quality control, SAP & HSP (or addenda);
 - d. Schedule of monitoring frequency; and
 - e. Description of verification sampling procedures if SQOs or performance standards are exceeded in routing monitoring.
3. Corrective Action:
 - a. Description of corrective action to be implemented in the event that cleanup or performance standards are not met (e.g., if exceedances of SQOs are detected, identify additional sampling and/or analysis to be conducted by Respondents to identify

- b. appropriate response actions, if any); and
 - b. Schedule for implementing these corrective actions.
- 4. Description of procedures for a request to EPA to reduce the frequency of or discontinue monitoring.
- 5. Records and reporting mechanisms required:
 - a. Laboratory records;
 - b. Records for long-term monitoring costs;
 - c. Documentation to comply with CERCLA 5-year Review Reporting Requirements;
 - d. Reports to State or Federal Agencies.

The final OMMP shall include detailed descriptions of all sampling activities, such as groundwater and sediment quality monitoring, and will establish requirements for quality assurance sampling activities including the sampling protocols, sample size, locations, frequency of testing, acceptance and rejection data sheets, problem identification and corrective measures reports, evaluation reports, acceptance reports, and final documentation. The OMMP shall include sediment sampling operations manual, quality assurance project plans, and health and safety plans for sediment sampling activities. Existing EPA-approved (HCC) QAPPs and other EPA-approved supporting documents may be referenced or included as appropriate.

V. RD/RA SCHEDULE OF DELIVERABLES AND MILESTONES

The schedule of notification to EPA for submission of major deliverables to EPA is described below. If the date of submission of any item or notification required by this SOW occurs on a weekend or federal holiday, the date of submission of that item or notification shall be the next working day following the weekend or holiday.

Item #	Milestone	Description
A. Slip 1 Pier Demolition & Segment 5 PSDDA Dredging		
1.	Remedial Design Work Plan	15 days after UAO effective date
2.	Final Design for Segment 5, including CQAP, OMMP, BA Addendum, Compensatory Mitigation Plan, draft plans & specifications, and project schedule & cost estimate	45 days after receipt of EPA comments on 90% design. [Note: EPA may provide conditional approval on portions of design, if necessary, to proceed with work elements in 2002]
3.	Remedial Action Work Plan	45 days after approval of Final Design
4.	Award RA Construction Contract	Not later than (NLT) 45 days after approval of design and RA work plan
5.	Notification of RA Start	30 days prior to start of construction
6.	Pre-Construction Inspection Meeting	15 days after award
7.	Initiate Construction	NLT 50 days after award
8.	RA Construction	To be completed NLT January 30, 2003
9.	Prefinal Construction Inspection/Meeting	NLT 30 days after completion of construction
10.	Prefinal Construction Inspection Letter/Report(s)	7 days after prefinal construction inspection
11.	Final Construction Inspections	NLT 30 days after completion of work identified in prefinal construction inspection letter
12.	Final Construction Letter/Reports(s)	NLT 30 days after final inspections
B. Remaining Segment 3, 4, & 5 Work		
13.	Preliminary (30%) Design for Segments 3 and 4	100 days after effective date of UAO

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14.	Draft (90%) Design for Segments 3 and 4, including draft CQAP, draft OMMP, draft BA Addendum, compensatory mitigation plan, outline of plans & specifications	60 days after receipt of EPA comments on 30% design
15.	Final (100%) Design for Segments 3 & 4 and Remainder of 5, including draft CQAP, draft OMMP, draft BA Addendum, Compensatory Mitigation Plan, draft plans & specifications, and project schedule & cost estimate	45 days after receipt of EPA comments on 90% design
16.	RA Work Plan, including final CQAP, Final OMMP, Plans & specifications and supporting documents	45 days after EPA approval of Final Design
17.	Award RA Construction Contract	NLT 60 days after approval of 100% design and RA work plan
18.	Notification of RA Start	30 days prior to start of construction
19.	Pre-Construction Inspection Meeting	15 days after award
20.	Initiate Construction	NLT 50 days after award
21.	RA Construction	As required in approved RD & RA Work Plans
22.	Prefinal Construction Inspection/Meeting	NLT 30 days after completion of construction
23.	Prefinal Construction Inspection Letter/Report(s)	7 days after prefinal construction inspection for each discrete element of the remedial action
24.	Final Construction Inspections/Meeting	NLT 30 days after completion of work identified each in prefinal construction inspection letter/report
25.	Final Construction Letter/Reports(s)	NLT 30 days after each final inspection/meeting
26.	RA Construction Report	NLT 30 days after last prefinal construction inspection/meeting

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27.	RA Completion Report	NLT 30 days after demonstrating Remedial Action Objectives, including SQOs for natural recovery areas, have been attained
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Table 1—Sediment Quality Objectives

Chemical	Sediment Quality Objective ^a
Metals (mg/kg dry weight; ppm)	
Antimony	150 ^A
Arsenic	57 ^B
Cadmium	5.1 ^B
Copper	390 ^L
Lead	450 ^B
Mercury	0.59 ^L
Nickel	>140 ^{A,B}
Silver	6.1 ^A
Zinc	410 ^B
Organic Compounds (µg/kg dry weight; ppb)	
Low Molecular Weight Polycyclic Aromatic Hydrocarbons (LPAH)	
	5,200 ^L
Naphthalene	2,100 ^L
Acenaphthylene	1,300 ^{A,B}
Acenaphthene	500 ^L
Fluorene	540 ^L
Phenanthrene	1,500 ^L
Anthracene	960 ^L
2-Methylnaphthalene	670 ^L
High Molecular Weight PAH (HPAH)	
	17,000 ^L
Fluoranthene	2,500 ^L
Pyrene	3,300 ^L
Benz[a]anthracene	1,600 ^L
Chrysene	2,800 ^L
Benzofluoranthenes	3,600 ^L
Benzo[a]pyrene	1,600 ^L
Indeno[1,2,3-cd]pyrene	690 ^L
Dibenz[a,h]anthracene	230 ^L
Benzo[ghi]perylene	720 ^L
Chlorinated Organic Compounds	
1,3-Dichlorobenzene	170 ^{A,L,B}
1,4-Dichlorobenzene	110 ^B
1,2-Dichlorobenzene	50 ^{L,B}
1,2,4-Trichlorobenzene	51 ^A
Hexachlorobenzene (HCB)	22 ^B
Total Polychlorinated Biphenyls (PCBs)	300[*]
Phthalates	
Dimethyl phthalate	160 ^L
Diethyl phthalate	200 ^B
Di- <i>n</i> -butyl phthalate	1,400 ^{A,L}
Butyl benzyl phthalate	900 ^{A,B}
Bis[2-ethylhexyl]phthalate	1,300 ^B

Table 1—Sediment Quality Objectives (Continued)

Chemical	Sediment Quality Objective ^a
Di- <i>n</i> -octyl phthalate	6,200 ^B
Phenols	
Phenol	420 ^L
2-Methylphenol	63 ^{A,L}
4-Methylphenol	670 ^L
2,4-Dimethylphenol	29 ^L
Pentachlorophenol	360 ^A
Miscellaneous Extractable Compounds	
Benzyl alcohol	73 ^L
Benzoic acid	650 ^{L,B}
Dibenzofuran	540 ^L
Hexachlorobutadiene	11 ^B
N-nitrosodiphenylamine	28 ^B
Volatile Organic Compounds	
Tetrachloroethene	57 ^B
Ethylbenzene	10 ^B
Total xylenes	40 ^B
Pesticides	
p,p'-DDE	9 ^B
p,p'-DDD	16 ^B
p,p'-DDT	34 ^B

^a Lowest apparent effects threshold among amphipod, oyster, and benthic infauna:

- A - amphipod mortality bioassay
- L - oyster larvae abnormality bioassay
- B - benthic infauna
- * - The sediment quality objective for human health was revised in EPA's 1997 ESD to a PCB SQO of 300 ug/kg.

TABLE 2 – Biological Criteria to be used for Hylebos Waterway RD/RA

Bioassay	Negative Control Performance Standard	Reference Sediment Performance Standard	Sediment Quality Standards Interpretation Endpoints (Hylebos RD/RA performance criteria)	Minimum Cleanup Level/SIZ Interpretation Endpoints
Amphipod (M expressed as %)	$M_C < 10\%$	$M_R < 25\%$	$M_T > 25\%$ Absolute and M_T vs M_R SD ($p=.05$)	$M_T - M_R > 30\%$ and M_T vs M_R SD ($p=.05$)
Larval (N expressed as actual counts)	$N_C \div I \geq 0.70$	$N_R \div N_C \geq 0.65$ (per QA/QC guidance)	$N_T/N_C \div N_R/N_C < 0.85$ and N_T/N_C vs N_R/N_C SD ($p=.10$)	$N_T/N_C \div N_R/N_C < 0.70$ and N_T/N_C vs N_R/N_C SD ($p=.10$)
<i>Neanthes</i> growth (MIG in mg/ind/d dry)	$M_C < 10\%$ and $MIG \geq 0.72$ mg/ind/d (dry) (or Case By Case)	$MIG_R \div MIG_C \geq 0.80$	$MIG_T/MIG_R < 0.70$ and MIG_T vs MIG_R SD ($p=.05$)	$MIG_T/MIG_R < 0.50$ and MIG_T vs MIG_R SD ($p=.05$)
Microtox	Case By Case	Case By Case (PSDDA, $BLD_R \leq 20\%$)	$ML_T \div ML_R < 0.80$ and ML_T vs ML_R SD ($p=.05$)	No Microtox MCUL criteria are established SQS level hit is valid for 2 hit rule

M = mortality, N = normals, I = initial count, MIG = mean individual growth rate, BLD = blank-corrected light decrease

SD = statistically different, NOCN = no other conditions necessary, N/A = not applicable

Subscripts: R = reference sediment, C = negative control, T = test sediment

DRAFT SMS EVALUATION ENDPOINTS (BIOASSAYS), Ecology 6/25/98

Figure 1: Segment 5 of Hylebos Waterway, August 2000 ESD

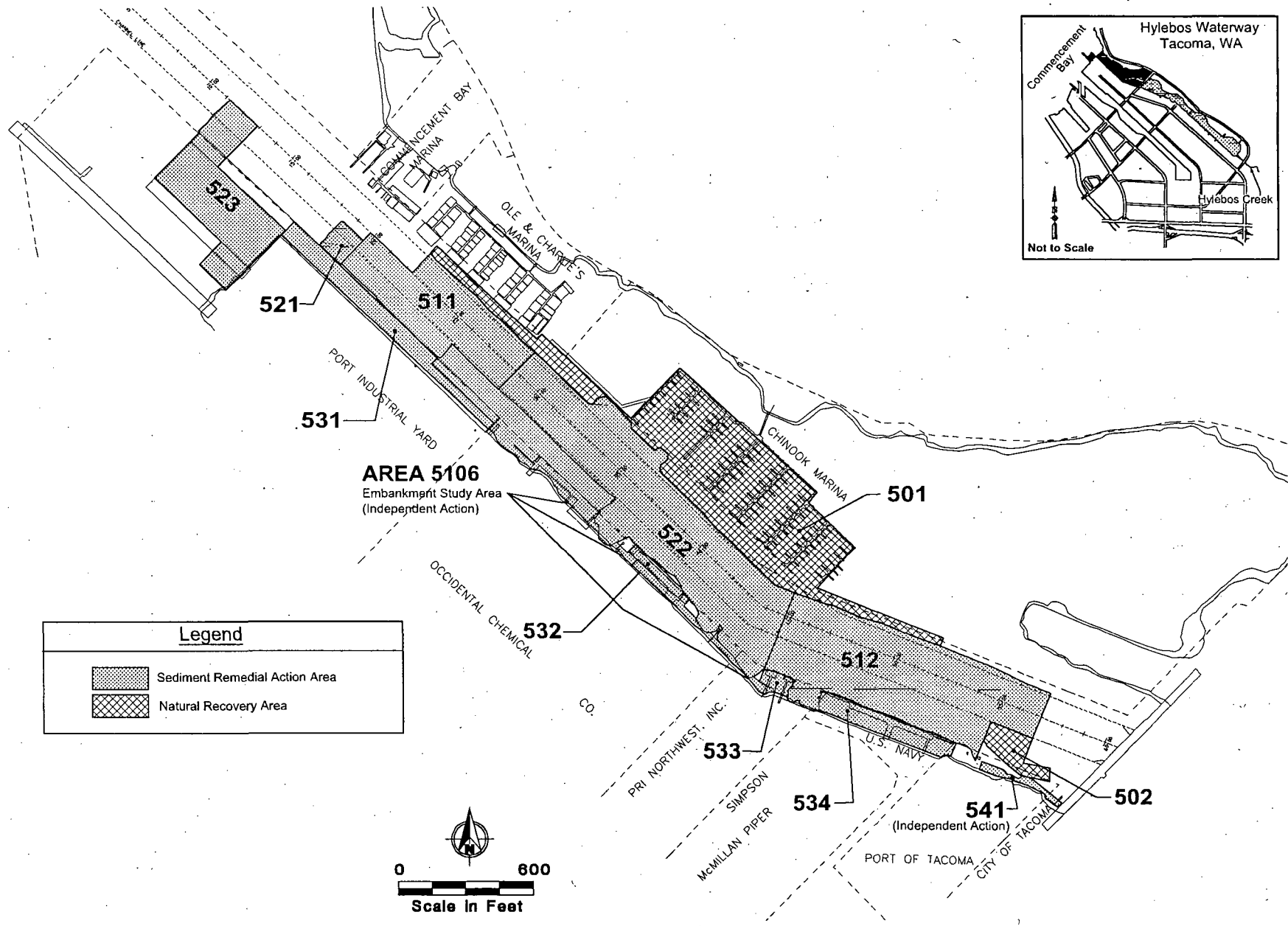


Figure 2: Segment 3 and 4 of Hylebos Waterway

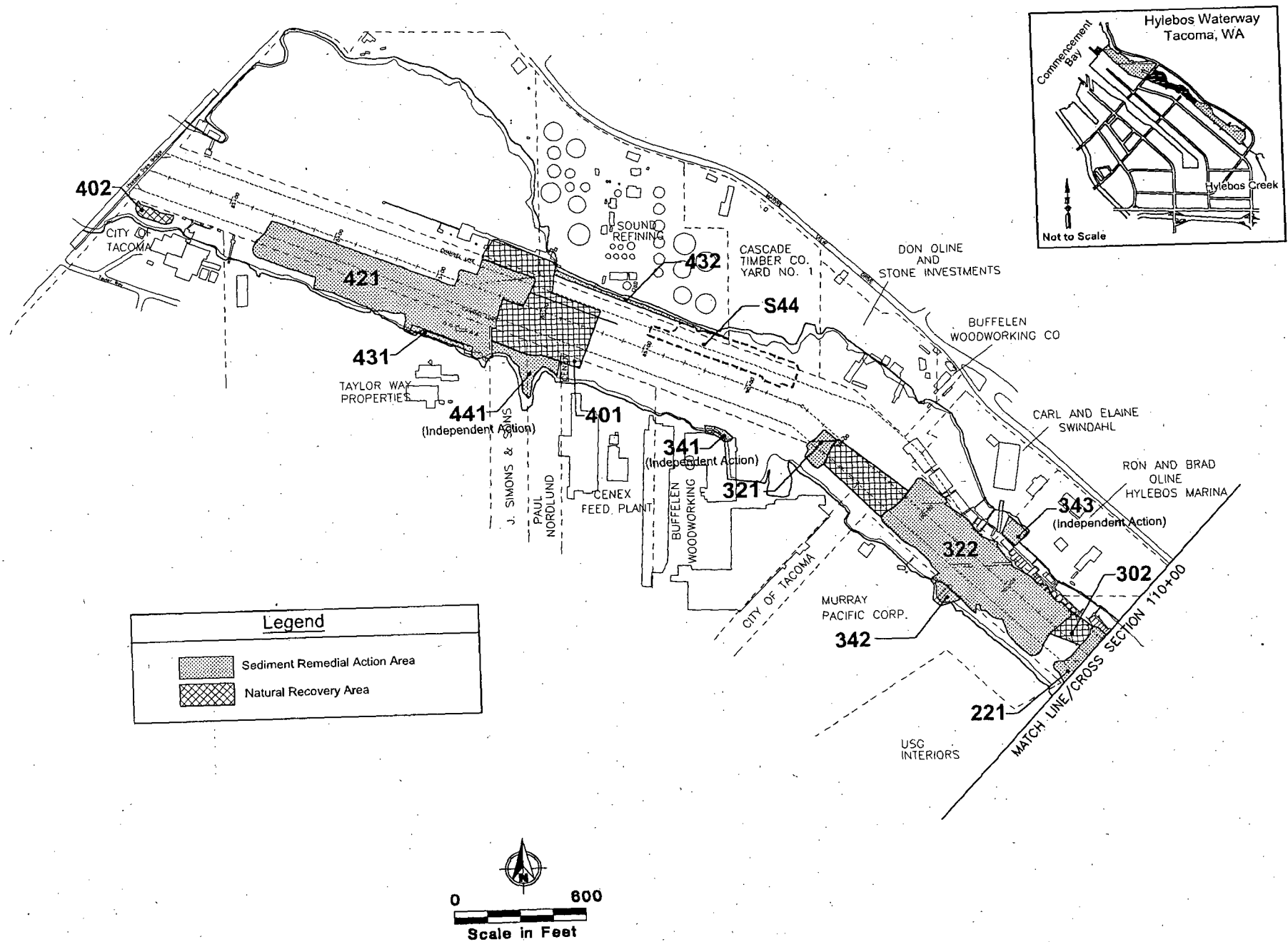
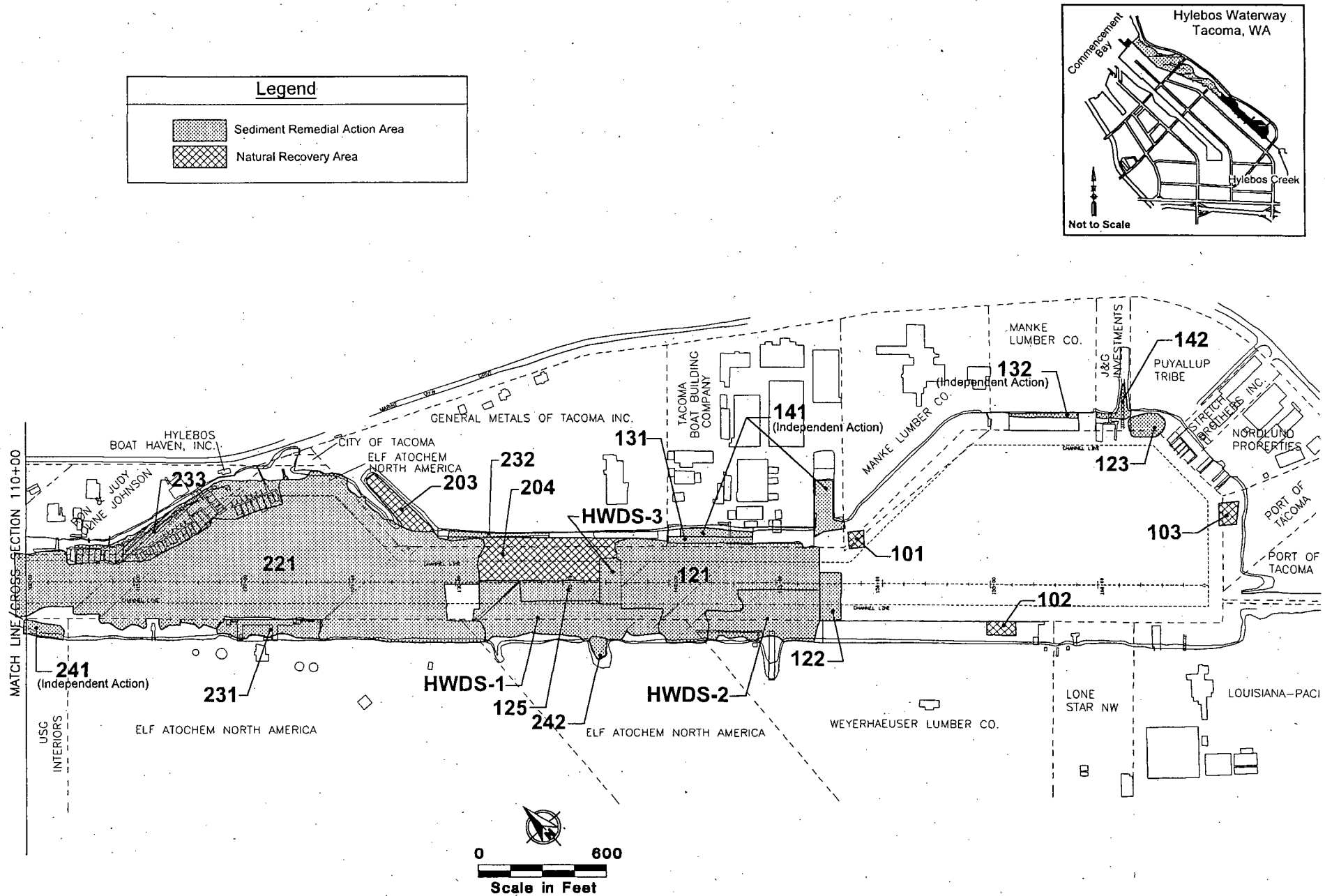
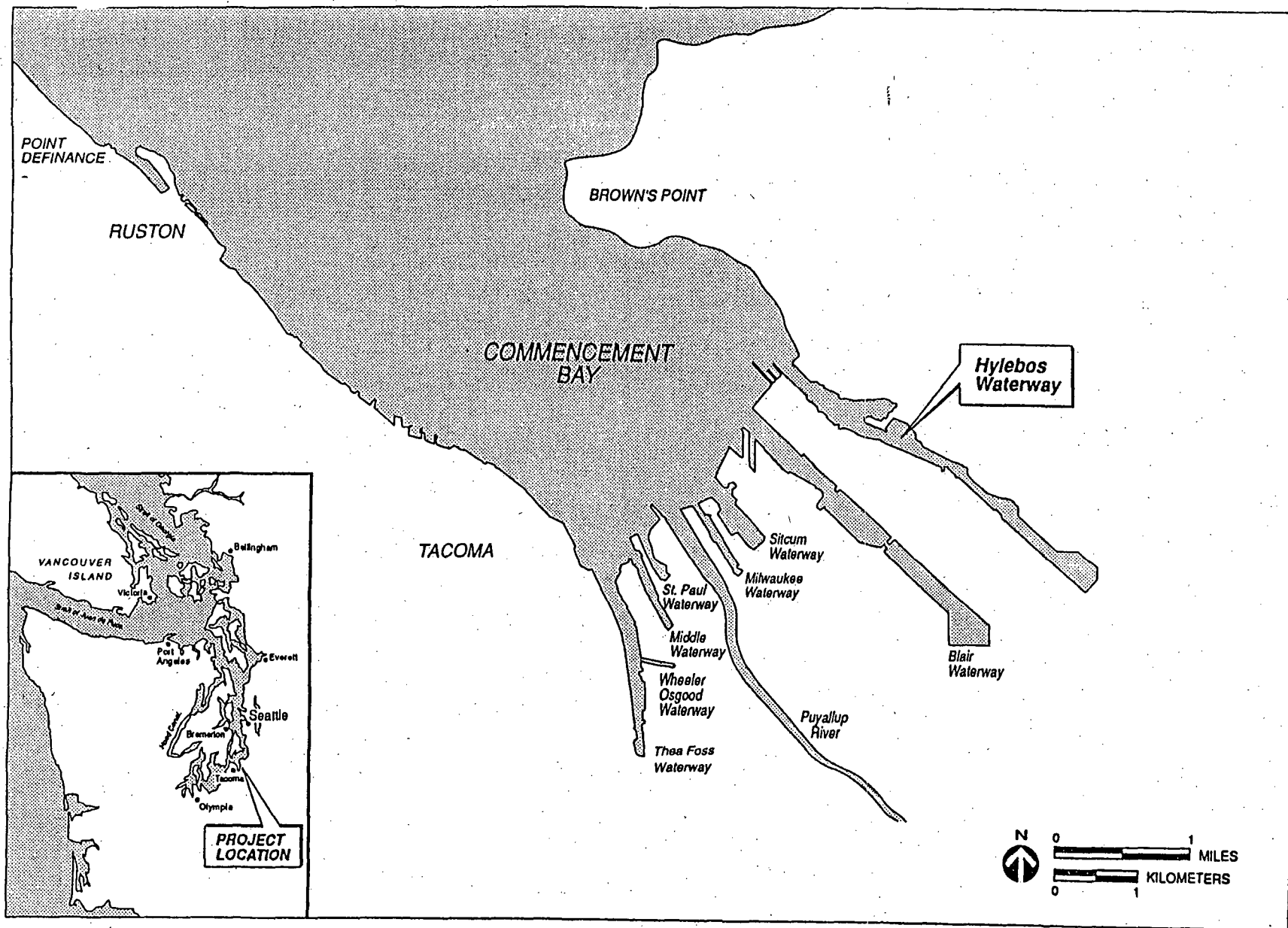


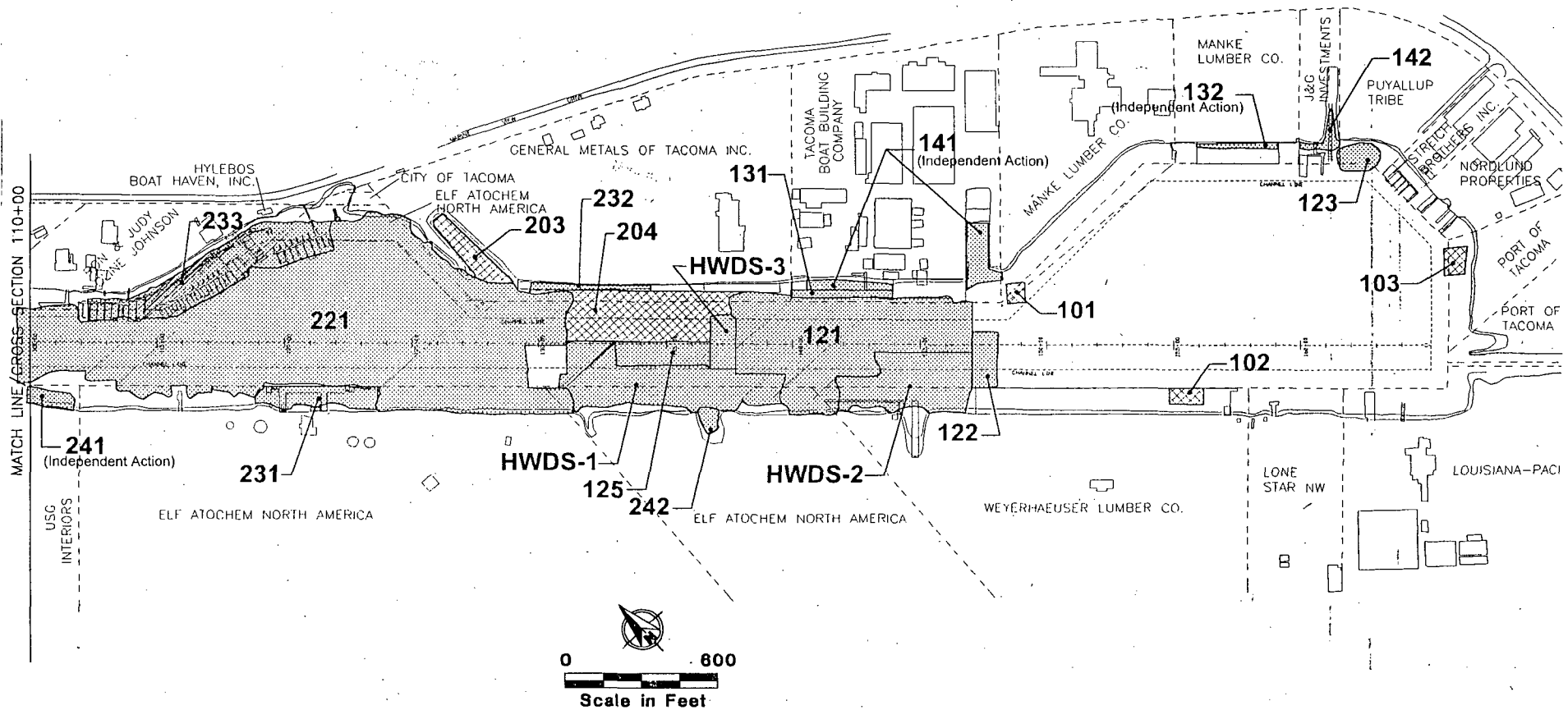
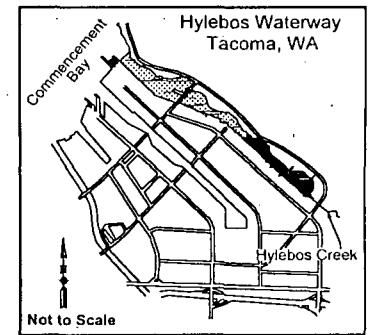
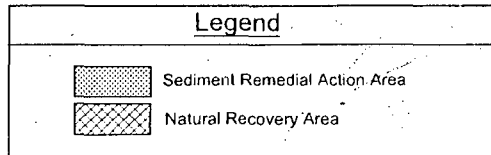
Figure 3: Segments 1 and 2 of Hylebos Waterway



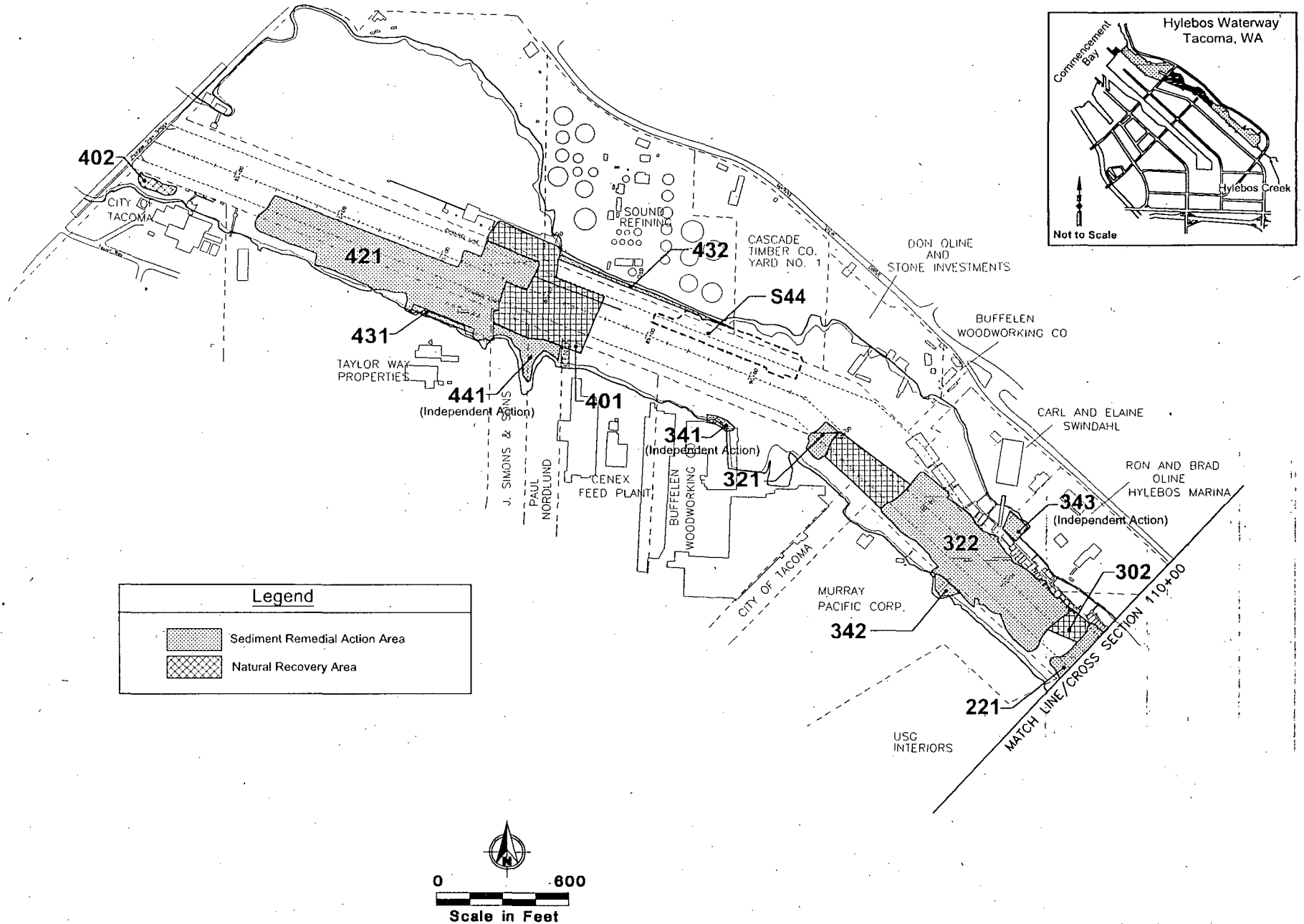


Attachment 2: Location of Hylebos Waterway in Commencement Bay, Washington.

ATTACHMENT 3



ATTACHMENT 3



ATTACHMENT 3

